Accident Analysis and Prevention 45 (2012) 792–801

Contents lists available at SciVerse ScienceDirect

Accident Analysis and Prevention

journal homepage: www.elsevier.com/locate/aap

Short-term outcomes of a motivation-enhancing approach to DUI intervention

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ARTICLE INFO

Article history:
Received 12 August 2011
Received in revised form 31 October 2011
Accepted 4 November 2011

Keywords:
Alcohol abuse
Drug abuse
Intervention
Motivation
Prevention

ABSTRACT

Objective: We compared a group-delivered, theory-based, motivation-enhancing program (PRIME For Life® – PFL, $n = 450$) to an intervention as usual (IAU, $n = 72$).
Method: Individuals convicted of a substance related offense in North Carolina, typically first offense alcohol and drug-impaired driving, participated in a PFL or IAU group. We compare the interventions on program satisfaction and changes made from preintervention to postintervention, and examined the moderating effects of demographics and alcohol dependence level.
Results: When significant, findings varied in magnitude from small to medium effects. Participants in both interventions showed intentions to use statistically significantly less alcohol and drugs in the future compared to their previous use, and differences between the groups were not statistically significant. Otherwise, findings favored PFL. PFL exhibited greater benefit than IAU on understanding tolerance, perceived risk for addiction, problem recognition, and program satisfaction. Additionally, IAU perceived less risk for negative consequences postintervention than they had at preintervention. Moderation analyses showed that the between-condition findings occurred regardless of gender, age, education, and number of alcohol dependence indicators. Additionally, younger people and those with more dependence indicators – groups of particular concern – showed the greatest change.
Conclusions: Findings suggest that a motivation-enhancing approach can be effective in producing short-term change in factors that can help facilitate and sustain behavioral change. This is consistent with previous research on the use of motivational approaches, and extends such findings to suggest promise in group-based settings and with people across demographic categories and dependence levels. Future research should focus on larger studies looking at long-term behavioral change, including recidivism.

1. Introduction

impaired drivers. While driving under the influence (DUI) has decreased dramatically in the past few decades, it is still a major cause of death, injuries and suffering. For example, 10,839 persons died in crashes where a driver had a blood alcohol concentration (BAC) at or above .08% in 2009 (National Highway Traffic Safety Administration [NHTSA], 2010). Lawmakers have enacted numerous legal approaches to prevent driving under the influence (National Highway Traffic Safety Administration [NHTSA] and National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2006), including tougher laws, administrative license revocation, intensive supervised probation, random alcohol and drug testing, vehicle forfeiture, and ignition interlocks. Despite these efforts, Compton and Berning (2009) report that in 2007, 2.2% of U.S. weekend night drivers were found (in roadside testing) to have a BAC at or above the legal limit of .08%, and 11.0% of daytime drivers and 16.3% of nighttime drivers tested positive for at least one illegal drug. It seems clear that legal remedies alone will not end impaired driving.

Not surprisingly, states have turned to mandated educational and treatment programs for addressing offenders' substance use problems. Research suggests that such interventions have beneficial effects. Wells-Parker et al. (1995) conducted a meta-analysis that included 215 independent evaluations of remediation approaches. For inclusion, remediation could have included, but not been limited to, education and psychological treatments. The authors concluded that combinations of mandated strategies, especially those involving education and counseling components, were effective in reducing recidivism. Subsequently, Wells-Parker and Williams (2002) found reductions in drinking–driving and

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0001-4575
doi:10.1016/j.aap.2011.11.004

alcohol-impaired crashes among offenders who completed mandated counseling-based intervention. Despite these encouraging findings, these authors noted in their meta-analysis that there are several limitations to current knowledge, including that decreases in recidivism after intervention are relatively modest and that it is unknown what programs are particularly effective.

1.1. Motivational enhancement as a practitioner delivery method

Maximizing the effectiveness of impaired driver interventions is important. To that end, theory and research suggest that targeting two types of cognitions, risk perceptions and intentions, may be particularly promising. For example, Bachman et al. (1998) found that low perceived risk from marijuana use predicted subsequent use. Engen et al. (1995) found that low perception of personal risk for developing alcoholism is linked to high-risk drinking and predicted recidivism in impaired driving three years later. Statements of behavioral intentions to reduce use have also been found to predict reductions in alcohol and drug use (Donovan and Rosengren, 1999; Kim and Hunter, 1993; Webb and Sheeran, 2006).

Practitioner delivery method is likely to be a key component in optimizing mandated program effectiveness when intervening with these cognitive factors. This may be particularly salient with mandated programs, given that resistance to program participation and behavioral change may be high. To that end, intervention developers have provided rationales for methods that avoid client resistance while increasing risk perception and motivation for lower risk behavior. Intervention approaches such as motivational interviewing (Miller and Rollnick, 2002), acceptance and commitment therapy (Hayes et al., 1999), and community reinforcement approach and family therapy (Meyers and Smith, 1997; Smith and Meyers, 2005) share commonalities. Practitioners of these models consider confrontational methods as being likely to engage participants' resistance, decrease their willingness to perceive personal risk or concern, and diminish motivation for change. Conversely, approaches that engage mutual exploration appear to increase motivation and enhance the likelihood of change. Indeed, research has shown that practitioner behavior influences resistance, and that resistance is associated with less behavior change (Bien et al., 1993; Moyers et al., 2007, 2009).

While there is significant literature about these interventions in alcohol or drug treatment, less is known about their application within substance impaired driving interventions. However, Brown et al. (2010) found greater benefit from a motivational interviewing (MI) approach compared to traditional information/advice. Compared to the control condition, the MI approach resulted in greater improvement at a 6-month follow-up in an alcohol misuse biomarker and significant declines in self-reported risky drinking days between the 6- and 12-month follow-up points.

Originally tested within individual counseling, developers have since expanded these techniques for use in group settings. This is important given that DUI prevention programs are often provided in group settings, both for cost-effectiveness as well as the opportunity for participants to learn from each other. Velasquez et al. (2006) discuss group-based MI strategies, and review the relatively small body of literature evaluating efficacy in this regard. Their review suggests promising effects for such group approaches; however, the studies are few and further research is needed.

1.2. PRIME For Life: motivational enhancement in DUI prevention

Given the need for effective DUI prevention programs, the common use of group programs for this purpose, and the promise of motivational, non-confrontational techniques in group settings, an understanding of the effects of such programs is needed. PRIME For Life (PFL) is one such program. PFL is a theory-based, indicated prevention program that focuses on altering substance use-related risk awareness and intrinsic motivation for change. It is a widely used program in the U.S., particularly for court-ordered DUI offenders. PFL targets common beliefs about risks for alcohol and drug-related problems, provides data-based information about risks attendant with high risk drug and alcohol use, and focuses on the importance of decision making in preventing future problems. This focus on the outcomes of high-risk drinking and drug use includes but is not limited to impaired driving. Guidelines for low-risk use are given, but the participant remains responsible for subsequent choices, an approach consistent with other motivational approaches.

While unpublished evaluations report within-group changes among PFL participants (Kallina-Knighton, 2002) as well as lower recidivism rates for PFL attendees compared to non-attendees (Fuchs and Hinton, 1995; Marsteller et al., 1997; Lowenkamp et al., 2007), published reports are sparse concerning the effectiveness of PFL. Most assess versions of PFL targeting underage and college age audiences. In an uncontrolled study, Oswalt et al. (2007) found posttest improvements in alcohol use, negative consequences, and perceived risk among sanctioned college students; with the findings for perceived risk being maintained at a three-month follow-up. Harrington et al. (1999) found changes in attitudes among sorority/fraternity members; however, their study suffered from implementation problems that make conclusions difficult to draw. A translated version for under-21 Swedish military recruits did not outperform a quasi-experimental control group condition (Hallgren et al., 2009), though limitations suggest the possibility of what Dobson and Cook (1980) refer to as a type III error (i.e., the evaluation mistakenly measures the quality of implementation rather than the intervention) (Daugherty, 2009). Given the wide use of PFL with adults, especially substance impaired drivers, the intervention field would benefit from comparison group evaluations with that population.

1.3. Study purpose

The purpose of this study was to examine the short-term efficacy of PFL, a motivation-enhancing and non-confrontational group approach for indicated DUI prevention, by comparing it to a program that did not specifically ensure that facilitators use such an intervention style. We first compared preintervention to postintervention change on risk-related cognitions between the PFL program and an intervention as usual (IAU). We hypothesized that PFL would show significant and superior changes from preprogram to postprogram attendance in key cognitive constructs known to be related to substance use behavior. We then extended the analyses by testing whether participant characteristics (age, gender, education, and symptoms of alcohol dependence) moderated change overall, or the effectiveness of PFL versus IAU.

2. Methods

Western Institutional Review Board (WIRB) determined that, as a secondary data analysis of existing data without identifiers, the study was exempt from the requirements of Human Subjects review.

2.1. Participant recruitment

All participants were convicted of a substance-related offense in North Carolina from 2007 to 2009. While a few had been arrested for offenses such as drug possession (3.0%) or under-age drinking (6.2%), the majority (91%) were individuals convicted of substance impaired driving. In North Carolina from 2007 to 2009, approximately 177,013 arrests occurred for driving while impaired, and

these resulted in 121,460 convictions.[1] The state required those convicted to complete requirements as a condition for driver's license re-instatement, a process overseen by the state's Division of Mental Health, Developmental Disabilities, and Substance Abuse Services. Study participants were drawn from those assigned to a 16-h program through the Alcohol Drug Education Traffic School (ADETS), which is typically about 17% of those convicted (North Carolina Department of Health and Human Services, 2010). Exclusion from attending such a program includes having a previous impaired driving conviction, being assessed with abuse or dependence, having had a blood alcohol concentration over .14%, or refusing a breathalyzer test.

The study was a non-randomized, pre–post comparison group design (Shadish et al., 2002). During the course of this evaluation, North Carolina introduced PRIME For Life but continued providing the previously used intervention (i.e., intervention as usual, IAU), providing an opportunity to compare the two interventions. Due to logistics, we were unable to randomly assign to conditions. Rather, ADETS scheduled them to a course based on the match between participant and course schedules. Hence, participants did not choose a class based on which course was being taught. There were no differences in class schedules between PFL and IAU classes that would lead to systematic differences between those attending the two conditions.

2.2. Procedures

In order to facilitate accurate data gathering, instructors in both programs were trained to use a structured administration protocol and script. At the beginning of the course, instructors informed participants of the purpose of the evaluation and that participation was anonymous. They passed out the paper and pencil preintervention measure at program initiation; a postintervention measure occurred immediately after instruction was completed. To link the two while allowing anonymous participation, instructors provided preprinted labels with subject IDs that individuals placed on their questionnaires. Participants placed their completed surveys in a stamped, self-addressed envelope, which was then sealed by the last participant. Participants were not required to complete the surveys and non-participation did not affect successful completion of the course.

2.3. Intervention conditions

2.3.1. PRIME For Life

PFL is a theory-based, manualized, structured, and motivation-enhancing program. PFL is based on the Lifestyle Risk Reduction Model (Thompson et al., 1984; Daugherty and Leukefeld, 2003), the Transtheoretical Model of Change (Prochaska and DiClemente, 1982), and persuasion theory (McGuire, 1974; Petty and Brinol, 2008). PFL's protocols and instructor training place a strong emphasis on the *manner* in which the intervention is delivered since there is strong empirical support for the value of such process variables in the delivery of treatment interventions (Miller and Rollnick, 2002; Moyers et al., 2005). Specifically, PFL incorporates three elements of empirically supported practices for treatment interventions: (a) establishing a collaboration with participants, (b) diffusion of resistance and (c) a clear direction on the part of the interventionist (Miller and Rollnick, 2002; Norcross, 2002).

The program was administered in 16-h groups, typically over a two-day period. PFL attempts to increase perception of personal risk for negative consequences resulting from drug use and high-risk drinking – with a special focus on impaired driving arrests or crashes – using carefully timed presentation of both logical arguments and emotional experiences. This perception of risk, in turn, is believed to help motivate the participant to reduce consumption and thereby avoid alcohol- or drug-related problems such as negative health, relationship, legal, and vocational consequences. Consistent with other effective brief interventions (e.g., Carey et al., 2009; Larimer and Cronce, 2007), PFL focuses on self-assessment of use and identification of related experiences/problems. Additional content includes the effects of alcohol and drugs, detailed information about avoiding future alcohol and drug related problems, and the role of biological factors (such as family history and low response to alcohol) in the development of alcoholism and addiction. The curriculum developer (Prevention Research Institute, PRI) trained program instructors to deliver concepts in a designated sequence, while using detailed syllabi and check-sheets to self-monitor adherence to the protocol.

2.3.2. Intervention as usual

The IAU curriculum was manual-based, lasted 16 h, and included a list of substance misuse topics and presentation guidelines. The program differed in two key ways from PFL. First, while use of motivation-based techniques was encouraged, it was not standardized, intensively trained, nor required. Second, the curriculum was less prescribed in terms of the content presented. Instead, it allowed instructor flexibility based on judgment about what topics were most salient for the group being lead. Instructors were able to select from a set of resources and handouts which provided information about the following: impaired driving (e.g., DUI laws, the scope and problems of driving impaired); the physical effects and historical perspective of drug use (e.g., concepts of use and misuse, the disease concept, information on special populations); and assessing personal issues (e.g., examining own use, financial cost of a DUI and other costs, identifying personal problems related to use, life skills, and available treatment options).

2.4. Facilitator selection and training

Of the 19 instructors, most were licensed or certified substance abuse professionals in North Carolina, with the remaining four in the process of obtaining such credentials. All instructors had at least three years experience as substance abuse counselors; there were no differences in years of counseling experience between those instructing the two programs. Nine instructors led the IAU courses, and had extensive experience and previous training for teaching that intervention. Ten others were trained for and served as PFL instructors, and participated in four days of initial training and an additional two-day skill building training two months later, and had approximately five months of PFL facilitation experience prior to the beginning of the study.

2.5. Measures

The pencil and paper measures took participants approximately 15 min to complete. Except for demographic items, all pretest questions were repeated at posttest. The posttest also included program evaluation items and questions about future substance use intentions. All items had been previously pilot-tested, and scales developed through psychometric evaluation using factor analysis.

2.5.1. Understanding of tolerance scale

We computed the mean of two items ("High tolerance protects people from having problems with alcohol" and "People who can handle alcohol are less likely to develop alcoholism") for a scale labeled "Understanding of Tolerance" (Cronbach's alpha = .71). The

[1] Numbers are retrieved from the North Carolina Alcohol Facts (NCAF) website and are approximate pending final entry of 2009 data (http://www.hsrc.unc.edu/ncaf/index.cfm?p=home).

questionnaire introduced the items with "These questions reflect thoughts people may have about different drinking and marijuana choices. Please answer with the response that most closely reflects your thoughts and feelings at the present time." Response categories were on a 5-item Likert scale (1 = *strongly agree*, 2 = *agree*, 3 = *uncertain*, 4 = *disagree*, and 5 = *strongly disagree*). High scores reflected more accurate beliefs about tolerance.

2.5.2. Perceived risk for addiction scale

We computed the mean of four items (which had the same instructions and response categories as the above items) to create this scale (Cronbach's alpha = .74). The items were "I could become an alcoholic", "If I drink as much as I have in the past, I could develop alcoholism", "If I use drugs as much as I have in the past, I could become addicted", and "I should drink less". We reverse coded the items so that higher scores reflected greater perception of risk.

2.5.3. Perceived risk for negative consequences scale

We computed the mean of three items (Cronbach's alpha = .90) as a scale which focused on perception of risk arising from the *frequency* of substance use. The items used the common stem, "On a scale of 1–5, what would be your risk if you. . .". Response categories were Likert scales (i.e., 1 = *no risk*, 2 = *some risk*, 3 = *medium risk*, 4 = *large risk*, and 5 = *great risk*) so that higher scores reflected greater recognition of the risk of negative outcomes. The items were ". . .smoked marijuana every day?", ". . .smoked marijuana once or twice a week?", and ". . .got drunk once or twice a week?"

2.5.4. Problem recognition

One item measured participants' belief that they had an alcohol- or drug-related problem: "Have you ever had an alcohol- or drug-related problem?" This was coded to create an ordinal measure ranging from no recognition of to acceptance of a problem (0 = *no*, 1 = *unsure*, 2 = *yes*).

2.5.5. Behavioral intentions

Three posttest questions addressed substance use intentions for the next 30 days. Two of the queries asked, "In the next 30 days, the most drinks I think I will have in a day is:" and "In the next 30 days, I think on days when I drink, I will usually have. . .". Response categories were *0*, *1–3*, *4–6*, *7–9*, *10–12*, *13–15*, *16–18*, *19–21*, *22–24*, and *25 or more*. The third item was used separately and asked about the frequency of smoking marijuana or using other drugs in the next 30 days ("In the next 30 days, I think I will smoke marijuana or take other drugs") with six response categories (coded as 0 = *never*, 1 = *1 time*, 2 = *2–3 times*, 3 = *about once a week*, 4 = *2–3 times a week*, and 5 = *most days*).

2.5.6. Substance use

Questions concerning quantity of drinking and frequency of marijuana or other drug use targeted the 30 days prior to program participation. Participants indicated the *most* drinks they had consumed in a day during the 30 days prior to their participation in the program, as well as their *usual number* of drinks in a day. Participants had the same 10 response options as for drinking intentions. Instructors were asked to teach the definition of a standard drink prior to the participants' answering the drinking questions. A similar item asked about marijuana use with the response categories the same as for marijuana use intentions. Questions about substance use during the same 30-day period prior to the intervention were also asked postintervention. Analyses utilized information collected at postintervention, as previous research indicates that individuals report higher – and presumably more accurate – levels of preintervention use when asked postintervention (Nason et al., 2010; Stinchfield, 1997).

2.5.7. Program satisfaction scale

We computed the mean of six items (Cronbach's alpha = .84) regarding the usefulness of various aspects of the intervention. Five Likert response categories were provided (1 = *strongly disagree*, 2 = *disagree*, 3 = *uncertain*, 4 = *agree*, and 5 = *strongly agree)*. Item wording was "This class changed my thinking about drug use", "This class changed my thinking about how much I should drink", "The workbook was useful", "This class helped me decide to drink less or use drugs less", "This class helped me feel confident about being able to drink less or use drugs less", and "This class helped me develop skills to be able to drink less or use drugs less". Higher scores indicated more positive reactions.

2.5.8. Indicators of possible alcohol dependence

At posttest, we used seven items to assess the possible presence of alcohol dependence (Russell et al., 2004; Saunders et al., 1993). These included such statements as "Have you sometimes taken a drink in the morning when you first got up?" and "During the last year have you failed to do what was normally expected of you because of your drinking?" Response categories were yes (=1) and no (=0). We summed the number of indicators endorsed. These indicators of dependence are based on the commonly used criteria for the diagnosis of alcohol abuse and dependence in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 2000).

2.6. Analysis plan

We performed all analyses in PASW v18 software. The first test involved testing the hypothesis that PFL would show greater change than IAU from pretest to posttest. We performed repeated measures regression analysis using generalized estimating equations (GEE, Hedeker and Gibbons, 2006) designating outcomes as continuous or ordinal, as appropriate. Predictors included Condition, Time, and the Time × Condition interaction. The Time effect reflected the overall preintervention to postintervention change across conditions. The Time × Condition interaction indicated whether PFL showed the hypothesized differential change compared to IAU. We computed Cohen's *d* effect sizes as a measure of the magnitude of change. We did this for change within each condition, and for differential change between conditions. We then added interaction terms into the GEE analysis to test for the moderating effects of gender, age, education, and number of indicators of alcohol dependence. A significant three-way interaction would indicate that certain types of people (e.g., younger) benefited differently (e.g., more or less) from PFL compared to IAU. Finally, we performed a cross-sectional *t*-test comparison of intervention conditions on the postintervention program satisfaction scale. We used list wise deletion in all analyses; rates of missing data were typically small (at most, 4.7% for any variable) and appeared to be due to random item skipping.

3. Results

3.1. Sample description

Table 1 shows the sample's descriptive information. Of the 664 participants completing the pretest, a total of 522 (79%) also completed the postintervention measures and these cases served as the analysis sample. Although the state's initial assessment sought to divert those with abuse or dependence to other treatment modalities, about a third of the sample reported having three or more indicators of possible alcohol dependence. We observed no attrition-related sample bias: chi-square tests and *t*-tests comparing those with and without posttests showed no significant differences in demographic data, drinking measures, nor marijuana

Table 1
Participant characteristics: means (standard deviations) and percentages, by condition.

	PRIME For Life ($n = 450$)	Intervention as usual ($n = 72$)
Age		
15–24	36.0%	32.4%
25–39	41.6%	44.1%
40+	22.4%	23.5%
Gender		
Male	64.2%	62.7%
Female	35.8%	37.3%
Highest education received		
High school/GED or less	36.7%	22.2%
Technical school graduate or some college	35.6%	36.1%
College degree(s)	27.7%	41.7%
Race/ethnicity		
African American/Black	11.6%	4.2%
Asian American/Asian	2.0%	1.4%
Latino/Hispanic	3.1%	1.4%
Native American	.4%	1.4%
White	79.1%	87.5%
Bi or Multiracial	1.3%	4.2%
Other	2.4%	.0%
Marital status		
Never married	53.4%	58.8%
Living together	7.0%	7.4%
Married	18.9%	17.6%
Separated	4.8%	1.5%
Divorced	14.5%	11.8%
Widowed	1.1%	2.9%
Indicators of alcohol dependence (DSM-IV[a])		
0	21.9%	32.3%
1	20.7%	26.2%
2	20.0%	15.4%
3	13.4%	13.8%
4–7	24.0%	12.3%
Usual number of drinks, last 30 days		
0	17.8%	14.2%
1–3	48.6%	52.9%
4–6	24.1%	28.6%
7 or more	9.5%	4.3%
Maximum drinks in a day, last 30 days		
0	19.6%	22.6%
1–3	22.8%	32.4%
4–6	31.5%	29.6%
7–9	11.2%	7.0%
10 or more	14.9%	8.4%
Used marijuana or other drugs, last 30 days		
Never	86.6%	91.6%
1–3 times	9.0%	4.2%
1–3 times a week	3.1%	1.4%
Most days	1.3%	2.8%

Percents may not add up to 100 due to rounding. All between-condition differences were non-significant ($p > .05$) except for education ($\chi^2 = 7.83$, $df = 2$, $p = .02$).

[a] The indicators of dependence are based on the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR). Published by the American Psychiatric Association (2000), this includes commonly used criteria for the diagnosis of alcohol abuse and dependence.

or other drug use at pretest. Although not randomly assigned, conditions did not differ from each other on any baseline demographic or outcome variables, except for a higher proportion of PFL versus IAU participants having only a high school education or less (165 of 450, 36.7%; and 16 of 72, 22.2%; respectively); $p = 02$.

3.2. GEE analysis of change

Table 2 shows changes on several outcomes for the PFL and IAU conditions. We categorized variables for greater interpretability; table footnotes show mean scores from the continuous distributions that were analyzed. In two cases (understanding tolerance and perceived risk for addiction), the significant Time effect indicated that both conditions showed improvement. However, significant Time × Condition effects reflected that PFL participants showed greater improvement than those in IAU. As seen in the table, far fewer remained in the "low" or "medium" categories for understanding tolerance and, for perceived risk for addiction, fewer were in the 'disagree' category. Within-condition effect sizes reflected medium and relatively small changes for PFL and IAU, respectively, and a medium sized difference between the conditions.

On the other Table 2 outcomes, nonsignificant Time effects indicated that the sample did not show overall change, but significant Time × Condition effects reflected that one condition did change. For problem recognition, PFL participants demonstrated some movement (a relatively small amount as measured by Cohen's *d*) out of pre-contemplation (no problem recognition) to being twice as likely as IAU participants to at least be unsure if not agree that they had ever had a problem (31.4% versus 14.1%). We observed a different pattern regarding perceived risk for negative consequences. While PFL participants showed no change, IAU had a small amount of deterioration in that they showed lower perception of substance use-associated risk at postintervention.

Table 3 shows results from GEE analyses that contrasted substance use reported for the 30-day period prior to participation versus intentions for the subsequent 30 days. For drug use, we did this for the overall sample but also – given the relatively smaller

Table 2
Comparison of interventions on general beliefs about substance use risk and problem recognition.

Scales/items	%		Type III tests of model effects				Cohen's *d*[d]	
	Pre	Post	Time		Time × Condition		Within-condition	Between-condition
			Wald χ^2 (df = 1)	p	Wald χ^2 (df = 1)	p		
Understanding of tolerance[a]			22.42	.000	8.21	.004		
PRIME For Life							.462	.461
Low	3.6%	1.3%						
Medium	17.3%	6.0%						
High	79.1%	92.7%						
Intervention as usual							.125	
Low	6.9%	2.8%						
Medium	13.9%	12.5%						
High	79.2%	84.7%						
Perceived risk for addiction[b]			89.89	.000	39.61	.000		
PRIME For Life							.690	.474
Low ("disagree")	46.0%	22.2%						
Medium ("uncertain")	42.0%	41.1%						
High ("agree")	12.0%	36.7%						
Intervention as usual							.209	
Low ("disagree")	50.0%	40.3%						
Medium ("uncertain")	33.3%	44.4%						
High ("agree")	16.7%	15.3%						
Perceived risk for negative consequences[c]			2.74	.098	5.66	.017		
PRIME For Life							.042	.217
No or some risk	40.1%	39.9%						
Medium risk	18.4%	15.9%						
Large or great risk	41.5%	44.3%						
Intervention as usual							.251	
No or some risk	36.1%	50.0%						
Medium risk	22.2%	13.9%						
Large or great risk	41.7%	36.1%						
Problem recognition			2.04	.154	4.31	.038		
PRIME For Life							.266	.367
No	80.5%	68.6%						
Unsure	8.8%	15.1%						
Yes	10.7%	16.3%						
Intervention as usual							.018	
No	85.9%	85.9%						
Unsure	4.2%	5.6%						
Yes	9.9%	8.5%						

Notes: Analysis sample sizes: PRIME For Life, n = 450; intervention as usual, n = 72.

[a] Higher scores reflect more accurate understanding of tolerance's effects (range 1–5). M (SD) preintervention and postintervention: Prime For Life, 4.19 (.86) and 4.61 (.65); intervention as usual, 4.19 (.96) and 4.30 (.80).

[b] Higher scores reflect greater risk awareness (range 1–5). M (SD) preintervention and postintervention: Prime For Life, 2.52 (.92) and 3.21 (1.00); intervention as usual, 2.61 (1.02) and 2.74 (.93).

[c] Higher scores reflect greater risk awareness (range 1–5). M (SD) preintervention and postintervention: Prime For Life, 2.96 (1.44) and 3.01 (1.42); intervention as usual, 3.07 (1.40) and 2.71 (1.47).

[d] Cohen's d computed two ways: within-condition is for the preintervention to postintervention change for each condition, between-condition is for the postintervention difference between conditions. Standard interpretations of Cohen's d: .20 = small, .50 = medium, and .80 = large effects.

number reporting drug use – for the subset who had used drugs in the last 12 months. For all outcomes (alcohol and drug), a significant Time effect indicated that both conditions showed intentions to use less in the future than they had in the past. The conditions did not differ meaningfully from each other in the amount of change. Specifically, the Time × Condition interactions were non-significant for usual number of drinks and marijuana/drug use. While this interaction was significant for maximum drinks in a day, this appeared to be due to a small preintervention difference in which PFL participants reported greater baseline drinking; both conditions showed similar future intentions postintervention. Effect size estimates showed that the magnitude of change on drinking variables was medium for PFL (and slightly less for IAU for usual number of drinks). For both conditions, effects were relatively small for the drug use outcome, but large for the subset of people who had used drugs during the last year.

3.3. Moderation analyses

We performed analysis for each moderator (gender, age, education, and number of alcohol dependence indicators) separately, due to the small IAU sample size. Of interest were the Time × Moderator and Time × Condition × Moderator interactions. These effects would reflect that change differed depending on the moderator, and the moderator by intervention condition. Due to the small sample size for IAU and relatively lower amounts of marijuana use in the sample, we could not estimate moderation analyses for the marijuana/drug use outcome.

We observed no significant Time × Condition × Moderator interactions; hence, when PFL showed greater change than IAU, this was true across gender, age, education, and number of dependence indicators. However, we observed significant Time × Moderator interactions for age and number of alcohol dependence indicators in predicting perceived risk for addiction: Wald χ^2 = 8.69, df = 2, p = .013, Wald χ^2 = 5.61, df = 2, p = .018. In addition to the finding above that PFL outperformed IAU on this outcome, Fig. 1 suggests that PFL had a positive effect on those 25–49 years old while IAU had the opposite. Fig. 2 shows that those with fewer indicators of dependence initially perceived less risk. Additionally, IAU had no effect on those with fewer indicators of dependence and a negative effect for those with the most. In contrast, while all indicator groups in the PFL condition showed subsequent increases

Table 3
Comparison of interventions on substance use future intentions compared to previous use.

Scales/items	Mean (*SD*)		Type III tests of model effects				Cohen's *d*[c]	
	Use in prior 30 days	Intentions for use in next 30 days	Time		Time × Condition		Within-condition	Between-condition
			Wald χ^2 (*df* = 1)	*p*	Wald χ^2 (*df* = 1)	*p*		
Usual number of drinks			44.80	<.000	.17	.680		
PRIME For Life	1.34[a] (1.08)	.92 (.68)					.434	.060
Intervention as usual	1.32 (1.18)	.88 (.62)					.354	
Maximum drinks in a day			96.39	<.000	3.98	.046		
PRIME For Life	1.94[a] (1.64)	1.12 (1.04)					.585	.009
Intervention as usual	1.69 (1.86)	1.13 (1.39)					.500	
Marijuana/other drug use frequency			20.44	<.000	1.03	.311		
PRIME For Life	.46[b] (1.13)	.25 (.88)					.297	.068
Intervention as usual	.50 (1.30)	.19 (.88)					.325	
Marijuana/other drug use frequency (drug users only)[d]			30.17	<.000	2.47	.116		
PRIME For Life	1.55[b] (1.59)	.79 (1.44)					.689	.086
Intervention as usual	2.40 (1.92)	.93 (1.79)					.871	

Analysis sample sizes: PRIME For Life, *n* = 450; intervention as usual, *n* = 72.
[a] Response categories for number of drinks: 0 = *0*, 1 = *1–3*, 2 = *4–6*, 3 = *7–9*, 4 = *10–12*, 5 = *13–15*, 6 = *16–18*, 7 = *19–21*, 8 = *22–24*, and 9 = *25+*.
[b] Response categories, coded from 0 to 6: 0 = *never*, 1 = *1 time*, 2 = *2–3 times*, 3 = *about once a week*, 4 = *2–3 times a week*, and 5 = *most days*.
[c] Cohen's *d* computed two ways: within-condition is for the preintervention to postintervention change for each condition, between-condition is for the postintervention difference between conditions. Standard interpretations of Cohen's *d*: .20 = small, .50 = medium, and .80 = large effects.
[d] PRIME For Life, *n* = 131; intervention as usual, *n* = 15.

in risk perception, those with more indicators showed greater change.

We also observed significant Time × Moderator interactions for age and number of alcohol dependence indicators for the comparisons of preintervention drinking with future intentions: Wald $\chi^2 = 6.35$, $df = 2$, $p = .042$ and Wald $\chi^2 = 5.49$, $df = 2$, $p = .019$ for usual number of drinks; Wald $\chi^2 = 8.09$, $df = 2$, $p = .018$ and Wald $\chi^2 = 14.45$, $df = 2$, $p < .001$ for maximum number of drinks. Figs. 3 and 4 – which combine PFL and IAU since the primary analysis showed no statistically significant difference on these outcomes – show that younger ages and those with more indicators of alcohol dependence reported greater usual and maximum drinking amounts at preintervention. However, their postintervention intentions were more in line with those of older participants and those with fewer dependence indicators.

3.4. Comparisons of intervention ratings

PFL participants rated their intervention more positively than those in IAU. A cross-sectional *t*-test showed a between-condition trend on the program satisfaction scale; $t(520) = 1.90$, $p = .058$. Means on this 1–5 scale were 4.12 and 3.96 ($SD = .66$ and .69) for PFL and IAU conditions, respectively, which represents a relatively small difference (Cohen's $d = .237$).

3.5. Discussion

Both interventions showed positive changes on some outcomes, while findings for others favored the use of the PFL intervention. In terms of an important outcome, intentions for future use, both interventions showed positive results and differences between the

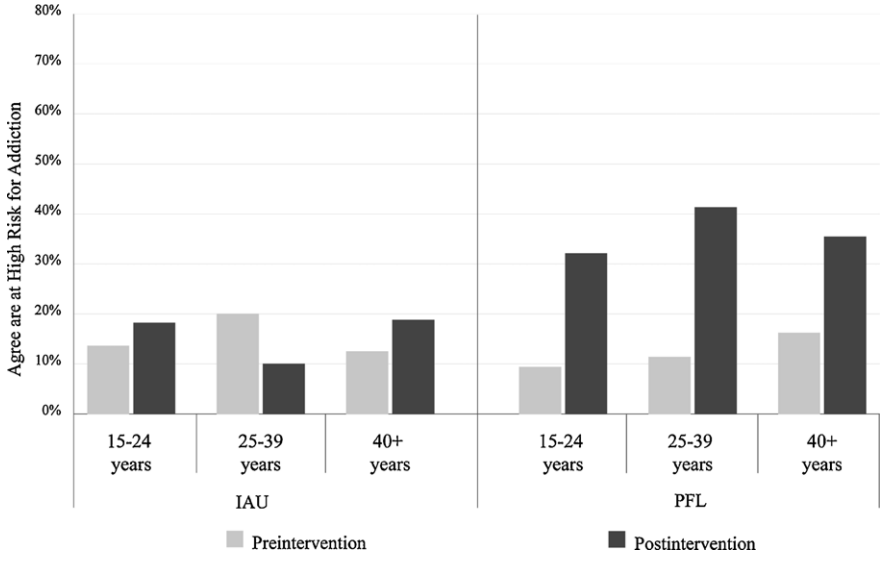

Fig. 1. Baseline to postintervention change in the percentage of participants who perceived themselves at risk for addiction, broken down by age.

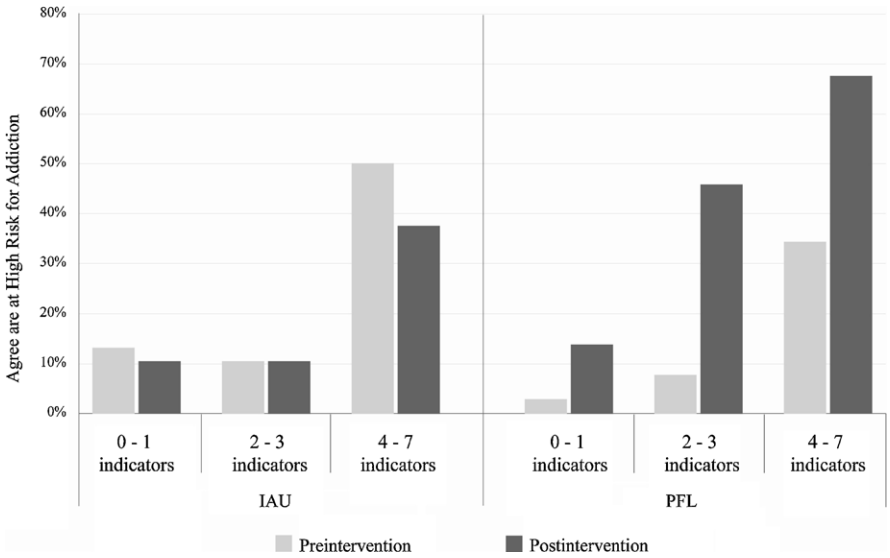

Fig. 2. Baseline to postintervention change in the percentage of participants who perceived themselves at risk for addiction, broken down by number of alcohol dependence indicators.

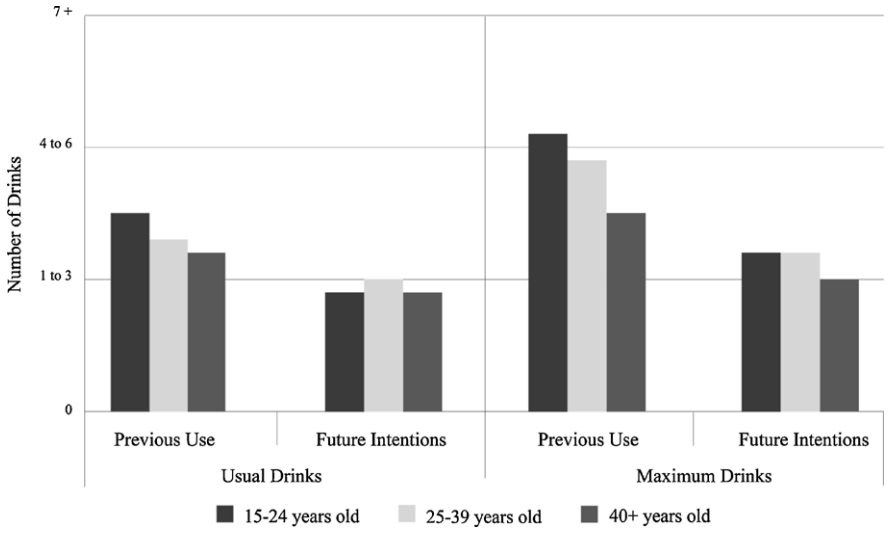

Fig. 3. Previous 30 day drinking compared to next 30 day intentions combining PFL and IAU conditions, broken down by age.

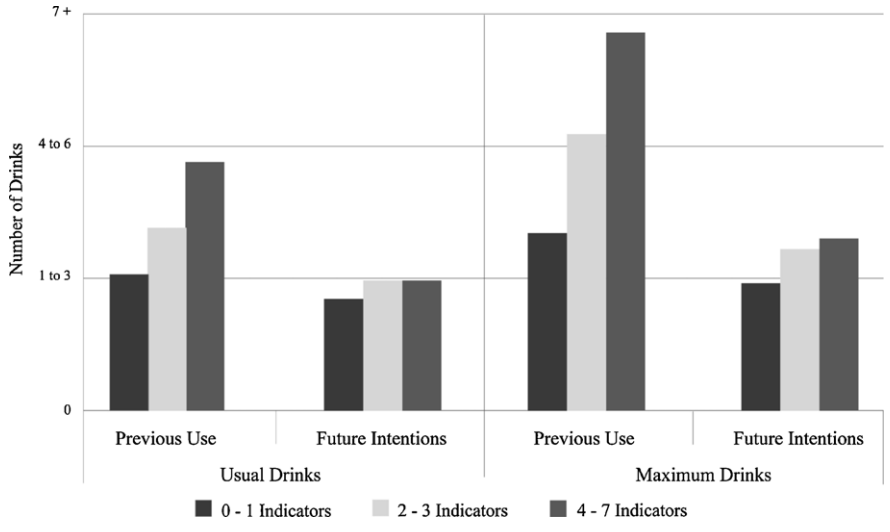

Fig. 4. Previous 30 day drinking compared to next 30 day intentions combining PFL and IAU conditions, broken down by number of indicators of alcohol dependence.

groups were not statistically significant. Specifically, participants showed intentions to use less alcohol and marijuana/drugs than they had preintervention. From the standpoint of practical significance, the number of intended usual and maximum drinks was – on average and across age and dependence groups – in the 1–3 drink range. This is important because this level of drinking is within the maximum drinks in a day guidelines from the National Institute of Alcoholism and Alcohol Abuse (2009; no more than 3 drinks for women and 4 for men) and those described in the PFL curriculum (no more than 3 drinks). This is an important result for both interventions given that intentions are a strong predictor of future behavior, a common finding and one that was shown in a meta-analysis of 47 experimental studies finding that changing intentions leads to behavior change (Webb and Sheeran, 2006). While PFL participants rated their intervention only slightly more positively than those in IAU, participants rated both conditions quite favorably. This is a positive finding given the initial resistance court-ordered participants often bring.

Otherwise, findings favored PFL. For example, PFL participants showed greater improvements – or in one case, no corresponding decrement – in cognitive outcomes. Given that cognitions are known to be related to behavior, the combination of intentions for lower risk substance use combined with PFL participants' superior improvement in perceived risk for addiction and problem recognition may increase the likelihood that they will successfully implement and sustain their lower-risk intentions. These findings are consistent with previous research supporting the use of non-confrontational and motivation-enhancing intervention approaches. In addition, the findings extend this by showing promise for such approaches when provided in group contexts.

When statistically significant, the calculated effect sizes for overall change or postintervention between-condition differences varied. Some were small, such as the difference in intervention ratings (which were nonetheless quite positive), as well as for changes in perceived risk for negative consequences and problem recognition. In other cases, effects were typically medium in size. For example, we found medium effects for PFL participants' understanding tolerance and perceived risk for addiction. Additionally, findings for drinking intentions (when contrasted with recent use) were of medium magnitude for both conditions. While, drug use intentions showed a small effect for both conditions in the overall sample, they were large when calculated for the subset of people who actually used drugs. Of course, these effects are short-term outcomes; longer term evaluations are needed to know whether they diminish, remain stable, or become larger over time.

We found the results of the moderation analyses encouraging. They suggest that the PFL versus IAU findings held across age, gender, education, and alcohol dependence. In other words, when PFL showed superiority in contrast to IAU, this was true across age, gender, education, and number of alcohol dependence indicators. This implies that a motivationally based intervention can be equally effective for a variety of individuals. Other findings from the moderation analyses were similarly encouraging: when interactions were significant, they indicated that subgroups with the greatest preintervention risks showed the greatest improvement. In the case of younger people, they improved to levels similar to other subgroups postintervention. Findings are particularly notable for people with more indicators of alcohol dependence. Although changes occurred for participants with no, one to two, and three or more indicators of potential dependence, those with three or more showed the greatest increases in perceived risk for addiction—a positive finding given that they are indeed likely to be at the greatest risk. Also, despite heavier previous drinking, these individuals showed intentions for future drinking much lower than their previous use and similar to people with fewer indicators.

This study's findings must be interpreted in light of its limitations, many of which are due to the challenges inherent in evaluating programs for mandated populations. First, we cannot know whether or how many participants changed their substance use following involvement in these programs. While we observed positive findings for future intentions, we cannot know for certain whether these cognitions translated into actual behavioral change. Second is the reliance on self-report, with no corroborative information. Third, the sample was not randomly assigned to conditions. Fourth, the relatively small size of the IAU sample might have limited the ability of the statistical analyses to uncover additional differences between the IAU and PFL groups, especially in the more complex moderation analyses. Finally, the study occurred in one state; the generalizability of these findings to other geographic areas is unknown.

Future research may extend these findings while addressing their limitations. Specifically, it would be profitable to conduct studies that use randomized control group designs, longitudinal measurement, and inclusion of both cognitive and behavioral outcomes. There also would be value in continued assessment of whether particular subpopulations benefit to a lesser or greater degree to motivational, group-based interventions; and the value of combining such interventions with other treatment or intervention strategies.

4. Conclusions

Several conclusions relevant to prevention practice can be drawn from these results. First, it is likely that motivation-enhancing intervention approaches designed for individual intervention (Brown et al., 2010; Wells-Parker and Williams, 2002) can be profitably extended to group settings. Second, the fact that participants with a greater number of alcohol dependence indicators benefited as well or better than others is consistent with the Wild and Cunningham (2001) findings that individuals with more alcohol problems are able to perceive their higher risk. This challenges several concepts about prevention with heavy substance users; for example, the idea that traditional approaches to DUI education may not have an effect on more dependent populations. The findings also raise questions about the common practice of bypassing motivational classroom interventions for the most problematic users and instead placing them directly in treatment. It appears that those with more dependence may benefit from this type of indicated intervention when done in a motivationally based manner. Future research might benefit from evaluating the value of using such intervention as an adjunct or as a precursor to treatment.

Conflict of interest

All authors are employees of Prevention Research Institute (PRI), the private nonprofit organization that develop and sells the PRIME For Life intervention.

Role of funding source

This study was conducted by Prevention Research Institute, the private nonprofit organization that developed and sells the PRIME For Life intervention.

Acknowledgements

The authors wish to thank Lynn Jones, DWI Services Program Manager in North Carolina, and the instructors who facilitated the interventions.

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